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BOAT WITH IMPROVED STRINGER AND METHOD OF MANUFACTURING SAME

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BOAT WITH IMPROVED STRINGER AND METHOD OF MANUFACTURING SAME

Background

[0001] This invention relates to a boat having a stringer for providing stiffening for the boat hull and support for a floor and a motor.

[0002] A conventional manufacturing technique used by boat manufacturers, especially in the manufacture of boats having hulls of glass fiber-reinforced resin, is to employ a stringer, often constructed of a low-density foam, which provides a relatively inexpensive way to form the structural framing of the boat and to both stiffen the molded hull of the boat and provide support for the floor of the boat. However, the low-density foam is often not strong enough to adequately mount a relatively heavy motor in the hull.

[0003] This invention is directed to a stringer for a boat hull which eliminates this problem.

Brief Description of the Drawings

[0004] Fig. 1 is an isometric view of a stringer according to an embodiment of the invention.

[0005] Fig. 2 is an isometric view of the stringer of Fig. 1, mounted in a boat hull.

[0006] Fig. 3 is a partial sectional view taken along the lines 3-3, respectively, of Fig. 1.

[0007] Fig. 4 is an enlarged view of a portion of the components of Fig. 3.

Detailed Description

[0008] Referring to Fig. 1 of the drawings the reference numeral 10 refers, in general, to a stringer according to an embodiment of the invention. The stringer 10 consists of an integral, unitary structure 10a formed by two spaced parallel beams 12 and 14, having three spaced cross pieces 16a and 16b, 18a and 18b, and 20a and 20b, respectively, formed integrally therewith and extending outwardly from their respective outer side surfaces. The transverse lengths of the cross pieces 16, 18, and 20 increase in a longitudinal direction along the beams 12 and 14 from the nose 22 to the other corresponding ends of the beams. A tapered nose 22 extends across corresponding ends of the beams 12 and 14 and is formed integrally therewith. The inner surfaces of the other end portions of the beams 12 and 14 are stepped to form notches 12a and 14a, respectively.

[0009] The structure 10a is fabricated from a relatively inexpensive, and therefore a relatively low-strength, material such as a relatively low-density foam. For example, the foam material can be in the form of a polyurethane foam that is injected into a mold so that the foam expands to fill the mold and, when cured, forms the integral, unitary structure.

[0010] The stringer 10 also includes two longitudinal struts 22a and 22b that extend from the latter ends of the beams 12 and 14, respectively, and two transverse struts 24a and 24b extending outwardly from the struts 22a and 22b, respectively. The struts 22a, 22b are fabricated from a relatively high-strength material that is stronger than the material of the structure 10a so that the struts can support a motor for the boat 10 in a manner to be described. An example of this high-strength material is a compressed, relatively high-density, foam, such as polyurethane, impregnated with fiberglass stands and\or one or more fiberglass mats to increase its density and strength. The struts 24a and 24b can be fabricated from the same material as the struts 22a and 22b.

[0011] One end portion of the strut 22a extends in the notch 12a, and one end portion of the strut 22b extends in the notch 14a, and the struts are secured in these positions in any conventional manner, such as by using a bonding agent in the manner discussed above. The struts 24a and 24b are secured to the struts 22a and 22b, respectively, in any conventional manner.

[0012] Fig. 2 depicts the stringer 10 installed in a boat hull 30 which is formed of a glass fiber-reinforced resin. The longitudinal axis of the stringer 10 coincides with the longitudinal axis of the hull 30 and the nose 22 of the stringer is positioned in the front portion of the hull 30. The above-mentioned varying lengths of the cross pieces 16, 18, and 20 are such that their respective ends engage the corresponding side walls of the hull 30. The struts 22a and 22b extend to, or near, the rear end of the hull 30, and the struts 24a and 24b extend towards the respective sides of the hull 30 with their respective ends engaging the inner wall of the hull. It is understood that the lower surfaces of the stringer 10 are contoured to conform or fit with the corresponding contoured surfaces of the hull 30.

[0013] After the stringer 10 is positioned in place in the hull 30 as shown in Fig. 2, one or more layers of a bonding agent, such as a reinforced putty, is applied at the seams between the lower surface of the stringer and the corresponding upper surface of the hull to effectively bond the stringer 10 in place in the hull. Then, a fiberglass cloth is placed over the upper and side surfaces of the stringer 10, including the structure 10a and the struts 22a, 22b, 24a and 24b, after which a resin, along with a suitable catalyst, is sprayed over the cloth so that it seeps through the cloth to the stringer 10. After curing, the stringer 10 is effectively bonded to the hull 30.

[0014] Also, the hull 30 and at least the structure 10a of the stringer 10 can be molded in the manner discussed above, and the stringer 10 placed in the hull 30 before the stringer and the hull are completely cured, which allows a chemical bonding between the contacting surfaces of the stringer and the hull. This latter technique can be in addition to, or in place of, the application of the bonding agent described above. If only the structure 10a of the stringer 10 is bonded to the hull 30 in the above manner then the struts 22a, 22b, 24a and 24c can be bonded to the stringer 10 by the bonding agent as discussed above. Then the fiberglass cloth and the resin would be applied as discussed above.

[0015] The structure 10 forms the structural framing of the boat and stiffens the hull 30 while, as stated above, the material forming the struts 22a and 22b is strong enough to support a motor (not shown) for the boat 10.

[0016] An example of a technique for mounting a motor to the inner vertical surfaces of the struts 22a and 22b is shown in Fig. 3. In particular, two generally U-shaped saddles, or cradles, 32a and 32b are placed over the struts 22a and 22b, respectively, adjacent the rear ends of the notches 12a and 14a, respectively, and are secured to the struts in any conventional manner, such as by a bonding agent in the manner discussed above. The saddles 32a and 32b extend longitudinally from the end of the notches 12a and 14a, respectively, towards the rear end of the hull 30 for a relatively short distance, and are fabricated from a relatively strong material, such as aluminum, to provide structural integrity for mounting the motor.

[0017] Two mounting brackets 34a and 34b are mounted to the inner vertical walls of the saddles 32a and 32b, respectively, in a manner better shown in Fig. 4 in connection with the mounting bracket 34a. In particular, a bolt 36 extends through aligned openings in the bracket 34a, the saddle 32a and the strut 22a and receives a nut 38 to secure the bracket. It is understood that the bracket 34b is mounted to the strut 22b in the same manner. In their mounted positions, a leg of each bracket 34a and 34b defines a horizontally extending mounted surface for receiving the motor, or a mount for a motor, that extends in the space between the brackets.

[0018] The stringer 10 defines an essentially planer upper surface for receiving a floor (not shown) which can be installed over at least a portion of the stringer 10 while defining a space in the hull 30 for housing the motor. The floor can be constructed of wood, or other suitable material, and can be fastened to the planar upper surface of the stringer 10 in any conventional manner. Also, the surfaces of the floor contacting the corresponding inner side surfaces of the hull 30 can be secured to the latter surfaces in any convention manner.

[0019] Although the stringer 10 provides significant flotation for the boat, it is understood that, before the floor is mounted in the above manner, additional flotation may be added to the boat by injecting an expandable foam into one or more of the spaces between the beams 12 and 14, the cross pieces 16a, 16b, 18a, 18b, 20a, and 20b, and the corresponding surfaces of the hull 30.

Variations and Alternatives

[0020] 1. A broad concept of this invention is the use of a relatively inexpensive, low-strength material that forms a portion of the stringer 10 to both stiffen the molded hull of the boat and provide support for the floor of the boat, and the use of a relatively high-strength material that supports the motor. Therefore, the invention is not limited to the specific materials (low and high-density foam) discussed above for the purpose of example only, but rather is equally applicable to other materials consistent with the above.

[0021] 2. The struts 22a and 22b and/or the struts 24a and 24b are not necessarily part of the stringer 10 but can be separate from the stringer.

[0022] 3. The struts 24a and 24b do not necessarily have to be fabricated from the same material as the struts 22a and 22b but rather can be fabricated from another material.

[0023] 4. The stringer 10 may be adapted to any configuration of boat hull.

[0024] 5. The motor mounting technique discussed above is merely one non-limitive example and other techniques can be utilized within the scope of the invention.

[0025] 7. One or both of the mounting brackets 34a and 34b may be mounted on only one of the struts or on both of the struts 22a and 22b.

[0026] 8. Additional mounting brackets, identical to the mounting brackets 34a and 34b, may be mounted on one or both of the struts 22a and 22b.

[0027] 9. The saddles 36a and 36b can be eliminated in which case the mounting brackets 38a and 38b would be mounted directly to the vertical walls of the struts 22a and 22b, respectively.

[0028] 10. The composition of the bonding agent discussed above may be varied, and, for example, a glass fiber-reinforced resin may be used as a bonding agent instead of, or in addition to, the reinforced putty.

[0029] 11. Spatial references, such as "horizontal", "vertical", "front", "rear", etc. are for the purpose of illustration only and do not limit the specific orientation or location of the structure described above.

[0030] Although only a few exemplary embodiments of this invention have been described in detail above, those skilled in the art will readily appreciate that many other modifications are possible in the exemplary embodiments without materially departing from the novel teachings and advantages of this invention. Accordingly, all such modifications are intended to be included within the scope of this invention as defined in the following claims. In the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents, but also equivalent structures.